

HAND TOOL HAVING A RETRACTABLE HANDLE STRUCTURE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a hand tool, and more particularly to
5 a hand tool having a retractable handle structure.

2. Description of the Related Art

A conventional hand tool, such as the wrench, screwdriver, socket or
the like, usually comprises a handle and a driving portion mounted on one end
of the handle. However, the handle has a fixed length, so that the working
10 length of the conventional hand tool is fixed and cannot be adjusted, thereby
limiting the versatility of the conventional hand tool.

SUMMARY OF THE INVENTION

The primary objective of the present invention is to provide a hand
tool having a retractable handle structure.

15 Another objective of the present invention is to provide a hand tool,
wherein the movable rod of the retractable shank can be retracted into and
expanded outward from the receiving chamber of the handle, so as to adjust the
distance between the retractable shank and the handle, so that the working
length of the hand tool can be adjusted easily, rapidly and arbitrarily.

20 A further objective of the present invention is to provide a hand tool,
wherein each of the limit grooves of the movable rod of the retractable shank
has a wall formed with a positioning recess for positioning the fixing pin by the

restoring force of the elastic member, so that the movable rod of the retractable shank is fixed on the handle rigidly and stably.

In accordance with the present invention, there is provided a hand tool comprising:

- 5 a retractable shank including a movable rod having an outer wall formed with a longitudinally arranged slideway and a plurality of transversely arranged limit grooves intersecting the slideways in a vertical manner;
- a handle telescopically mounted on the retractable shank; and
- at least one fixing pin extended through the handle and having a
- 10 distal end slidably mounted in the slideway of the movable rod of the retractable shank and slidably positioned in either one of the limit grooves of the movable rod of the retractable shank.

Further benefits and advantages of the present invention will become apparent after a careful reading of the detailed description with appropriate

15 reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an exploded perspective view of a hand tool in accordance with the preferred embodiment of the present invention;

Fig. 2 is a perspective assembly view of the hand tool as shown in Fig.

20 1;

Fig. 3 is a schematic operational view of the hand tool as shown in Fig. 2;

Fig. 4 is a schematic operational view of the hand tool as shown in Fig. 3;

Fig. 5 is a plan cross-sectional view of the hand tool as shown in Fig. 2;

5 Fig. 6 is a plan cross-sectional view of the hand tool as shown in Fig. 3;

Fig. 7 is a cross-sectional view of the hand tool taken along line 7-7 as shown in Fig. 6;

10 Fig. 8 is a plan cross-sectional view of the hand tool as shown in Fig. 4;

Fig. 9 is a cross-sectional view of the hand tool taken along line 9-9 as shown in Fig. 8;

Fig. 10 is a perspective view of a hand tool in accordance with another embodiment of the present invention;

15 Fig. 11 is a schematic operational view of the hand tool as shown in Fig. 10;

Fig. 12 is an exploded perspective view of a hand tool in accordance with another embodiment of the present invention;

20 Fig. 13 is a perspective assembly view of the hand tool as shown in Fig. 12;

Fig. 14 is a perspective view of a hand tool in accordance with another embodiment of the present invention;

Fig. 15 is a perspective view of a hand tool in accordance with another embodiment of the present invention;

Fig. 16 is a perspective view of a hand tool in accordance with another embodiment of the present invention;

5 Fig. 17 is a perspective view of a hand tool in accordance with another embodiment of the present invention;

Fig. 18 is a perspective view of a hand tool in accordance with another embodiment of the present invention; and

Fig. 19 is a perspective view of a hand tool in accordance with
10 another embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings and initially to Figs. 1 and 2, a hand tool 10 in accordance with the preferred embodiment of the present invention comprises a retractable shank 20, a handle 30 telescopically mounted on the retractable shank 20, and an elastic member 40 (such as a spring) mounted
15 between the retractable shank 20 and the handle 30.

The retractable shank 20 includes a movable rod 22 and a driving portion 21 mounted on one end of the movable rod 22. The movable rod 22 of the retractable shank 20 has an outer wall formed with two longitudinally arranged opposite slideways 23, a first transversely arranged limit groove 24
20 intersecting the slideways 23 in a vertical manner, a second transversely arranged limit groove 25 intersecting the slideways 23 in a vertical manner,

and a third transversely arranged limit groove 26 intersecting the slideways 23 in a vertical manner. Preferably, the three limit grooves 24, 25 and 26 are in parallel with each other. In addition, each of the three limit grooves 24, 25 and 26 has an end provided with a protruding stop portion 27.

5 The handle 30 has an inside formed with a receiving chamber 31 for receiving the movable rod 22 of the retractable shank 20 and the elastic member 40.

 The hand tool 10 further comprises two fixing pins 33 each extended through the handle 30 and each having a distal end slidably mounted in the
10 respective slideway 23 of the movable rod 22 of the retractable shank 20 and slidably positioned in either one of the three limit grooves 24, 25 and 26 of the movable rod 22 of the retractable shank 20. Preferably, the distal end of each of the two fixing pins 33 is extended into the receiving chamber 31 of the handle 30. In addition, the distal end of each of the two fixing pins 33 is stopped by the
15 stop portion 27 of either one of the three limit grooves 24, 25 and 26 of the movable rod 22 of the retractable shank 20.

 The handle 30 has a periphery formed with two opposite through holes 32 for receiving the two fixing pins 33. Preferably, each of the two opposite through holes 32 of the handle 30 communicates with the receiving
20 chamber 31 of the handle 30.

In operation, referring to Figs. 3-9 with reference to Figs. 1 and 2, each of the two fixing pins 33 is initially received in the third limit groove 26 of the movable rod 22 of the retractable shank 20.

Then, the handle 30 is rotated relative to the movable rod 22 of the retractable shank 20, so that each of the two fixing pins 33 is moved in the third limit groove 26 of the movable rod 22 of the retractable shank 20 to the position as shown in Figs. 2 and 5, where each of the two fixing pins 33 is aligned with the respective slideway 23 of the movable rod 22 of the retractable shank 20.

Then, the movable rod 22 of the retractable shank 20 is pressed to be retracted into the receiving chamber 31 of the handle 30, so that each of the two fixing pins 33 is moved in the respective slideway 23 of the movable rod 22 of the retractable shank 20 from the position as shown in Fig. 2 to the position as shown in Figs. 3, 6 and 7, where each of the two fixing pins 33 is aligned with the second limit groove 25 of the movable rod 22 of the retractable shank 20.

Then, the handle 30 is rotated relative to the movable rod 22 of the retractable shank 20, so that each of the two fixing pins 33 is moved into the second limit groove 25 of the movable rod 22 of the retractable shank 20 and is stopped by the stop portion 27 of the second limit groove 25 of the movable rod 22 of the retractable shank 20 as shown in Figs. 4, 8 and 9.

Thus, the movable rod 22 of the retractable shank 20 can be retracted into and expanded outward from the receiving chamber 31 of the handle 30, so

as to adjust the distance between the retractable shank 20 and the handle 30, so that the working length of the hand tool 10 can be adjusted easily, rapidly and arbitrarily.

Referring to Figs. 10 and 11, in accordance with another embodiment of the present invention, each of the three limit grooves 24, 25 and 26 of the movable rod 22 of the retractable shank 20 has a wall formed with a positioning recess 28 extended downward for positioning the fixing pin 33 by the restoring force of the elastic member 40. Preferably, the positioning recess 28 is located adjacent to the stop portion 27.

Referring to Figs. 12 and 13, in accordance with another embodiment of the present invention, the elastic member 40 is undefined, and the hand tool 10 further comprises a first magnetic member 50 mounted on a distal end of the movable rod 22 of the retractable shank 20, and a second magnetic member 50 mounted on a bottom of the handle 30 and having a polarity the same as that of the first magnetic member 50, so that the first magnetic member 50 is repulsive with the second magnetic member 50.

Referring to Fig. 14, in accordance with another embodiment of the present invention, the driving portion 21a of the retractable shank 20 is a ratchet wrench, and the handle 30 has an end provided with a driving portion 34.

Referring to Fig. 15, in accordance with another embodiment of the present invention, the driving portion 21b of the retractable shank 20 is a socket wrench.

Referring to Fig. 16, in accordance with another embodiment of the present invention, the driving portion 21c of the retractable shank 20 is a direction controllable socket wrench.

Referring to Fig. 17, in accordance with another embodiment of the present invention, the driving portion 21d of the retractable shank 20 is a screwdriver head.

Referring to Fig. 18, in accordance with another embodiment of the present invention, the driving portion 21e of the retractable shank 20 is a box-ended wrench.

Referring to Fig. 19, in accordance with another embodiment of the present invention, the driving portion 21f of the retractable shank 20 is an open-ended wrench.

Although the invention has been explained in relation to its preferred embodiment(s) as mentioned above, it is to be understood that many other possible modifications and variations can be made without departing from the scope of the present invention. It is, therefore, contemplated that the appended claim or claims will cover such modifications and variations that fall within the true scope of the invention.